



PAT McCRORY  
Governor

NICHOLAS J. TENNYSON  
Secretary

February 9, 2016

CONTRACT: DB00258  
WBS ELEMENT: 17BP.2.R.59  
FEDERAL-AID NO: STATE FUNDED  
COUNTY: Beaufort  
ROUTE: SR 1326  
DESCRIPTION: Replace Bridge #105 over Broad Creek on SR 1326

### ADDENDUM 3

TO: PROSPECTIVE BIDDERS

Please note the following revision to the proposal for the above referenced project.

- On Page 1 the first line should read  
“DATE AND TIME OF BID OPENING: **FEBRUARY 24, 2016**”
- On Page 4 under Traditional Paper Bids item 10 should read :  
“**10. THE PROPOSAL WITH THE ITEMIZED PROPOSAL SHEET ATTACHED SHALL BE PLACED IN A SEALED ENVELOPE AND SHALL BE DELIVERED TO AND RECEIVED IN THE NCDOT DIVISION 2 OFFICE, LOCATED AT 105 PACTOLUS HIGHWAY, GREENVILLE, NC 27834, BY 11:00 AM ON, WEDNESDAY, FEBRUARY 24, 2016.**”
- On Page 4 under Traditional Paper Bids item 11 should read  
“**11. The sealed bid must display the following statement on the front of the sealed envelope:**  
**ATTN: SARAH LENTINE**  
**QUOTATION FOR DB00258 (REPLACEMENT OF BRIDGE 105 IN BEAUFORT CO)**  
**TO BE OPENED AT 11:00 AM ON WEDNESDAY, FEBRUARY 24, 2016.**”
- After the last page of the Proposal the document “Bridge Foundation Recommendations” should be added totaling 11 pages.





PAT McCRORY  
*Governor*

NICHOLAS J. TENNYSON  
*Secretary*

The contract will be prepared accordingly.

Sincerely,

A handwritten signature in blue ink that reads 'Josh Wilder'.

Josh Wilder  
Engineering Technician

cc: Mr. Ed Eatmon, PE  
Mr. Cadmus Capehart, PE



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
RALEIGH, N.C.

PROPOSAL

DATE AND TIME OF BID OPENING: **FEBRUARY 24, 2016 AT 11:00 AM**

CONTRACT ID DB00258  
WBS 17BP.2.R.59

FEDERAL-AID NO. STATE FUNDED  
COUNTY BEAUFORT  
T.I.P. NO.  
MILES 0.214  
ROUTE NO. SR 1326  
LOCATION BRIDGE #105 ON SR 1326 OVER BROAD CREEK

TYPE OF WORK REPLACE BRIDGE #105 ON SR 1326 OVER BROAD CREEK

**NOTICE:**

ALL BIDDERS SHALL COMPLY WITH ALL APPLICABLE LAWS REGULATING THE PRACTICE OF GENERAL CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA WHICH REQUIRES THE BIDDER TO BE LICENSED BY THE N.C. LICENSING BOARD FOR CONTRACTORS WHEN BIDDING ON ANY NON-FEDERAL AID PROJECT WHERE THE BID IS \$30,000 OR MORE, EXCEPT FOR CERTAIN SPECIALTY WORK AS DETERMINED BY THE LICENSING BOARD. BIDDERS SHALL ALSO COMPLY WITH ALL OTHER APPLICABLE LAWS REGULATING THE PRACTICES OF ELECTRICAL, PLUMBING, HEATING AND AIR CONDITIONING AND REFRIGERATION CONTRACTING AS CONTAINED IN CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA. NOTWITHSTANDING THESE LIMITATIONS ON BIDDING, THE BIDDER WHO IS AWARDED ANY FEDERAL - AID FUNDED PROJECT SHALL COMPLY WITH CHAPTER 87 OF THE GENERAL STATUTES OF NORTH CAROLINA FOR LICENSING REQUIREMENTS WITHIN 60 CALENDAR DAYS OF BID OPENING.

**BIDS WILL BE RECEIVED AS SHOWN BELOW:**

**THIS IS A ROADWAY & STRUCTURE PROPOSAL**

\_\_\_\_\_

**INSTRUCTIONS TO BIDDERS****PLEASE READ ALL INSTRUCTIONS CAREFULLY  
BEFORE PREPARING AND SUBMITTING YOUR BID.**

All bids shall be prepared and submitted in accordance with the following requirements. Failure to comply with any requirement may cause the bid to be considered irregular and may be grounds for rejection of the bid.

**TRADITIONAL PAPER BIDS:**

1. Download the entire proposal from the Connect NCDOT website and return the entire proposal with your bid.
2. All entries on the itemized proposal sheet (bid form) shall be written in ink or typed.
3. The Bidder shall submit a unit price for every item on the itemized proposal sheet. The unit prices for the various contract items shall be written in figures. Unit prices shall be rounded off by the Bidder to contain no more than FOUR decimal places.
4. An amount bid shall be entered on the itemized proposal sheet for every item. The amount bid for each item shall be determined by multiplying each unit bid by the quantity for that item, and shall be written in figures in the "Amount" column of the form.
5. The total amount bid shall be written in figures in the proper place on the bid form. The total amount bid shall be determined by adding the amounts bid for each item.
6. Changes to any entry shall be made by marking through the entry in ink and making the correct entry adjacent thereto in ink. A representative of the Bidder shall initial the change in ink. Do not use correction fluid, correction tape or similar product to make corrections.
7. The bid shall be properly executed on the included **Execution of Bid – Non-collusion Affidavit, Debarment Certification and Gift Ban Certification** form. All bids shall show the following information:
  - a. Name of corporation, partnership, limited liability company, joint venture, individual or firm, submitting bid. Corporations that have a corporate seal should include it on the bid.
  - b. Name of individual or representative submitting bid and position or title held on behalf of the bidder.
  - c. Name, signature, and position or title of witness.
  - d. Completed attestation by Notary Public**Note: Signer, Witness and Notary Public must be different individuals.**
8. The bid shall not contain any unauthorized additions, deletions, or conditional bids.
9. The Bidder shall not add any provision reserving the right to accept or reject an award, or to enter into a contract pursuant to an award.
10. **THE PROPOSAL WITH THE ITEMIZED PROPOSAL SHEET ATTACHED SHALL BE PLACED IN A SEALED ENVELOPE AND SHALL BE DELIVERED TO AND RECEIVED IN THE NCDOT DIVISION 2 OFFICE, LOCATED AT 105 PACTOLUS HIGHWAY, GREENVILLE, NC 27834, BY 11:00 AM ON, WEDNESDAY, FEBRUARY 24, 2016.**
11. The sealed bid must display the following statement on the front of the sealed envelope:

**ATTN: SARAH LENTINE  
QUOTATION FOR DB00258 (REPLACEMENT OF BRIDGE 105 IN BEAUFORT CO)  
TO BE OPENED AT 11:00 AM ON WEDNESDAY, FEBRUARY 24, 2016.**

12. If delivered by mail, the sealed envelope shall be placed in another sealed envelope and the outer envelope shall be addressed as follows:

**N. C. DEPARTMENT OF TRANSPORTATION  
ATTN: SARAH LENTINE  
PO BOX 1587  
GREENVILLE, NC 27835-1587**

**OPTIONAL COMPUTER BID PREPARATION:**

1. All instructions given above for completing and returning TRADITIONAL PAPER BIDS apply, except as modified by the provision "Computer Bid Preparation (Optional)", if applicable.
2. Expedite software necessary for electronic bid preparation may be downloaded from the Connect NCDOT website at: <https://connect.ncdot.gov/letting/Pages/EBS-Information.aspx>




STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY  
GOVERNOR

ANTHONY J. TATA  
SECRETARY

April 23, 2014

MEMORANDUM TO: Maria A. Rogerson, P.E.  
Division Bridge Program Manager

FROM: K. J. Kim, Ph.D., P.E.   
Eastern Regional Geotechnical Manager

STATE PROJECT: 17BP.2.R.59 (SF-060105)

FEDERAL PROJECT:

COUNTY: Beaufort

DESCRIPTION: Bridge No. 105 on SR 1326 (Turkey Trot Rd. 2) over Broad Creek

SUBJECT: Bridge Foundation Recommendations

The Geotechnical Engineering Unit has completed the subsurface investigation and has prepared the foundation design recommendations for the above structure and presents the following project data:

- Bridge Inventory (6) pages
- Foundation Design Recommendations (3) pages
- Design Calculations ( ) pages
- Special Provisions ( ) pages

Please call Majid Khazaei, P.E. or Chris Kreider, P.E. at (919) 662-4710 if there are any questions concerning this memorandum.

KJK/CAK/MK  
Attachment

MAILING ADDRESS:  
EASTERN REGIONAL OFFICE  
GEOTECHNICAL ENGINEERING UNIT  
1570 MAIL SERVICE CENTER  
RALEIGH NC 27699-1570

TELEPHONE: 919-662-4710  
FAX: 919-662-3095

WEBSITE: [WWW.DOH.DOT.STATE.NC.US](http://WWW.DOH.DOT.STATE.NC.US)

LOCATION:  
3301 JONES SAUSAGE RD., SUITE 100  
GARNER, NC 27529-9489

# FOUNDATION RECOMMENDATIONS

WBS: 17BP.2.R.59

DESCRIPTION : Bridge No. 105 on SR 1326 (Turkey Trot Rd. 2)

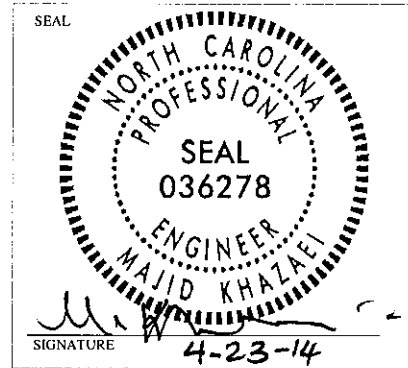
T.I.P. NO.: SF-060105

over Broad Creek

COUNTY: Beaufort

STATION: 13+30.00 -L-

	INITIALS	DATE
DESIGN	MK	4/23/14
CHECK	CAK	4/23/14
APPROVAL	KSK	4/24/14



BENT	STATION	FOUNDATION TYPE	FACTORED RESISTANCE	MISCELLANEOUS DETAILS
END BENT 1	12+60.00 ± -L-	Cap on 12" Square Prestressed Concrete Piles	65 tons/pile	Bottom of Cap El. = 2.0 ft ± Estimated Length of Pile = 40 ft ± Number of Piles = 7 ✓
BENT 1	13+05.00 ± -L-	Cap on 16" Square Prestressed Concrete Piles with Steel Pile Tips	120 tons/pile	Bottom of Cap El. = 2.0 ft ± Point of Fixity = -25 ft ± Tip Elevation No Higher than = -33.0 ft Estimated Length of Pile = 45 ft ± Number of Piles = 7 ✓
BENT 2	13+55.00 ± -L-	Cap on 16" Square Prestressed Concrete Piles with Steel Pile Tips	120 tons/pile	Bottom of Cap El. = 2.0 ft ± Point of Fixity = -25 ft ± Tip Elevation No Higher than = -33.0 ft Estimated Length of Pile = 45 ft ± Number of Piles = 7 ✓
END BENT 2	14+00.00 ± -L-	Cap on 12" Square Prestressed Concrete Piles	65 tons/pile	Bottom of Cap El. = 2.0 ft ± Estimated Length of Pile = 40 ft ± Number of Piles = 7 ✓

**NOTES ON PLANS & COMMENTS**

See Following Pages

## **FOUNDATION RECOMMENDATION NOTES ON PLANS**

- 1) FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- 2) PILES AT END BENT NO. 1 AND 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 65 TONS PER PILE.
- 3) DRIVE PILES AT END BENT NO. 1 AND 2 TO A REQUIRED DRIVING RESISTANCE OF 90 TONS PER PILE.
- 4) PILES AT BENT NO. 1 AND 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 120 TONS PER PILE.
- 5) DRIVE PILES AT BENT NO. 1 AND 2 TO A REQUIRED DRIVING RESISTANCE OF 165 TONS PER PILE.  
THIS REQUIRED DRIVING RESISTANCE INCLUDES ADDITIONAL RESISTANCE FOR DOWNDRAW OR SCOUR.
- 6) INSTALL PILES AT BENT NO. 1 AND BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN -33.0 FT.
- 7) STEEL PILE TIPS ARE REQUIRED FOR PRESTRESSED CONCRETE PILES AT BENT NO. 1 AND 2.  
FOR STEEL PILE TIPS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- 8) IF NECESSARY, PREDRILL PILE LOCATIONS AT BENT NO. 1 AND 2 TO ELEVATION -30 FT WITH  
EQUIPMENT THAT WILL RESULT IN A MAXIMUM PREDRILLING DIAMETER OF 24".  
FOR PREDRILLING FOR PILES, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- 9) SPUDGING MAY BE USED INSTEAD OF PREDRILLING AT BENT NO. 1 AND 2.
- 10) THE SCOUR CRITICAL ELEVATION FOR BENT NO. 1 AND 2 IS ELEVATION -12.0 FT. SCOUR CRITICAL ELEVATIONS  
ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
- 11) TESTING THE FIRST END BENT PILE WITH THE PDA DURING DRIVING, RESTRIKING  
OR REDRIVING IS REQUIRED. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD  
SPECIFICATIONS AND FOR PILE DRIVING CRITERIA, SEE PILE DRIVING CRITERIA PROVISION.
- 12) TESTING THE FIRST INTERIOR BENT PILE WITH THE PDA DURING DRIVING, RESTRIKING  
OR REDRIVING IS REQUIRED. FOR PDA TESTING, SEE SECTION 450 OF THE STANDARD  
SPECIFICATIONS AND FOR PILE DRIVING CRITERIA, SEE PILE DRIVING CRITERIA PROVISION.
- 13) IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF  
30 to 45 FT-KIPS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT BOTH END BENT NO. 1 AND 2.  
THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING  
EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.
- 14) IT HAS BEEN ESTIMATED THAT A HAMMER WITH AN EQUIVALENT RATED ENERGY IN THE RANGE OF  
40 to 60 FT-KIPS PER BLOW WILL BE REQUIRED TO DRIVE PILES AT BOTH BENT NO. 1 AND 2.  
THIS ESTIMATED ENERGY RANGE DOES NOT RELEASE THE CONTRACTOR FROM PROVIDING DRIVING  
EQUIPMENT IN ACCORDANCE WITH SUBARTICLE 450-3(D)(2) OF THE STANDARD SPECIFICATIONS.

## **FOUNDATION RECOMMENDATION COMMENTS**

- 1) 1½:1 (H:V) SLOPE AT THE END BENTS ARE OK WITH SLOPE PROTECTION.
- 2) REINFORCED BRIDGE APPROACH FILLS ARE REQUIRED AT EACH END BENT.
- 3) THE DESIGN SCOUR ELEVATION FOR BENT NO. 1 IS -7.5 FT.
- 4) THE DESIGN SCOUR ELEVATION FOR BENT NO. 2 IS -8.5 FT.
- 5) NO WAITING PERIOD IS REQUIRED BEFORE BEGINNING ANY WORK FOR END BENT CONSTRUCTION  
AFTER COMPLETION OF THE EMBANKMENT AT EACH END BENT.
- 6) THE REQUIRED DRIVING RESISTANCE AT BOTH END BENTS AND THE INTERIOR BENTS ARE BASED  
ON A DYNAMIC DRIVING RESISTANCE FACTOR OF 0.75 IN CONJUNCTION WITH A MINIMUM OF TWO PDA  
TESTS (ONE AT THE END BENT AND ONE AT THE INTERIOR BENT).

## PILE PAY ITEMS

(Revised 8/15/12)

WBS ELEMENT 17BP.2.R.59

TIP NO. SF-060105

COUNTY Beaufort

STATION 13+30.00 -L-

DATE 4/23/2014

DESIGNED BY MK

CHECKED BY CAR

DESCRIPTION Bridge No. 105 on SR 1326 (Turkey Trot Rd. 2)  
over Broad Creek

NUMBER OF BENTS WITH PILES	<u>2</u>	}	Only required for "Predrilling for Piles" & "Pile Excavation" pay items
NUMBER OF PILES PER BENT	<u>7</u>		
NUMBER OF END BENTS WITH PILES	<u>          </u>		
NUMBER OF PILES PER END BENT	<u>          </u>		

Bent # or End Bent #	PILE PAY ITEM QUANTITIES						PDA Testing (per each)
	Steel Pile Points (yes/no)	Pipe Pile Plates (yes/no/maybe)	Predrilling For Piles (per linear ft)	Pile Redrives (per each)	Pile Excavation (per linear ft)		
					In Soil	Not In Soil	
End Bent #1	no			2			X
Bent #1	yes		240	2			
Bent #2	yes		210	2			
End Bent #2	no			2			
<b>TOTALS</b>			450	8	0	0	2

Notes:

Blanks or "no" represent quantity of zero.

If steel pile points are required, calculate quantity of "Steel Pile Points" as equal to the number of steel piles.

If pipe pile plates are or may be required, calculate the quantity of "Pipe Pile Plates" as equal to the number of pipe piles.

Show quantity of "PDA Testing" on the plans as total only.

If quantity of "PDA Testing" is 3 or less, reference "Pile Driving Criteria" provision in PDA notes on plans and include "Pile Driving Criteria" provision in the contract.



## **PILE DRIVING CRITERIA**

(9-18-12)

Revise the *2012 Standard Specifications* as follows:

**Page 4-72, Subarticle 450-3(D)(3) Required Driving Resistance, lines 26-30**, delete first paragraph and replace with the following:

The Engineer will determine if the proposed pile driving methods and equipment are acceptable and provide the blows/ft and equivalent set for the required driving resistance noted in the plans, i.e., "pile driving criteria" except for structures with pile driving analyzer (PDA) testing. For structures with PDA testing, provide pile driving criteria for any bents and end bents with piles in accordance with Subarticle 450-3(F)(4).

**Page 4-73, Subarticle 450-3(F) Pile Driving Analyzer, lines 45-48**, delete third paragraph and replace with the following:

The Engineer will complete the review of the proposed pile driving methods and equipment within 7 days of receiving PDA reports and pile driving criteria. Do not place concrete for caps or footings on piles until PDA reports and pile driving criteria have been accepted.

**Page 4-75, Subarticle 450-3(F) Pile Driving Analyzer**, add the following:

(4) Pile Driving Criteria

Analyze pile driving with the GRL Wave Equation Analysis Program (GRLWEAP) manufactured by Pile Dynamics, Inc. Use the same PDA Consultant that provides PDA reports to perform GRLWEAP analyses and develop pile driving criteria. Provide driving criteria sealed by an engineer approved as a Project Engineer (key person) for the same PDA Consultant.

Analyze pile driving so driving stresses, energy transfer, ram stroke and blows/ft from PDA testing and resistances from CAPWAP analyses correlate to GRLWEAP models. Provide pile driving criteria for each combination of required driving resistance and pile length installed for all pile types and sizes. Submit 2 copies of pile driving criteria with PDA reports. Include the following for driving criteria:

- (a) Project information in accordance with Subarticle 450-3(F)(3)(a)
- (b) Table showing blows/ft and equivalent set vs. either stroke for multiple strokes in increments of 6" or bounce chamber pressure for multiple pressures in increments of 1 psi
- (c) Maximum stroke or blows/ft or pile cushion requirements to prevent overstressing piles as needed
- (d) GRLWEAP software version information
- (e) PDF copy of all pile driving criteria and executable GRLWEAP input and output files

**Page 4-76, Article 450-4 MEASUREMENT AND PAYMENT**, add the following:

The contract unit price for *PDA Testing* will also be full compensation for performing GRLWEAP analysis and developing and providing pile driving criteria.

STATE	STATE PROJECT REFERENCE NO.	SHEET	TOTAL SHEETS
N.C.	SF-060105	1	6

**STATE OF NORTH CAROLINA**  
**DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL ENGINEERING UNIT**

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 17BP.2.R.59 (SF-060105) F.A. PROJ. \_\_\_\_\_  
COUNTY BEAUFORT  
PROJECT DESCRIPTION BRIDGE NO. 105 ON SR 1326 (TURKEY  
TROT RD. 2) OVER BROAD CREEK AT -L- STA. 13+30

**CONTENTS**

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	BORE LOGS

**CAUTION NOTICE**

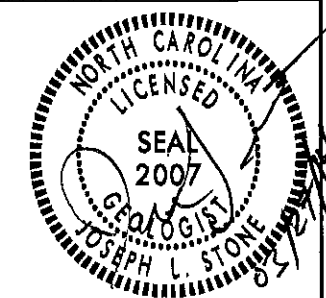
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1901 TOTT-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

PERSONNEL  
J.D. GEMPERLINE  
R.E. SMITH  
D.G. PINTER

INVESTIGATED BY J.L. STONE  
CHECKED BY D.N. ARGENBRIGHT  
SUBMITTED BY D.N. ARGENBRIGHT  
DATE MARCH 2014



**PROJECT: 17BP.2.R.59 ID: SF-060105**

DRAWN BY: C.P. TURNER

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

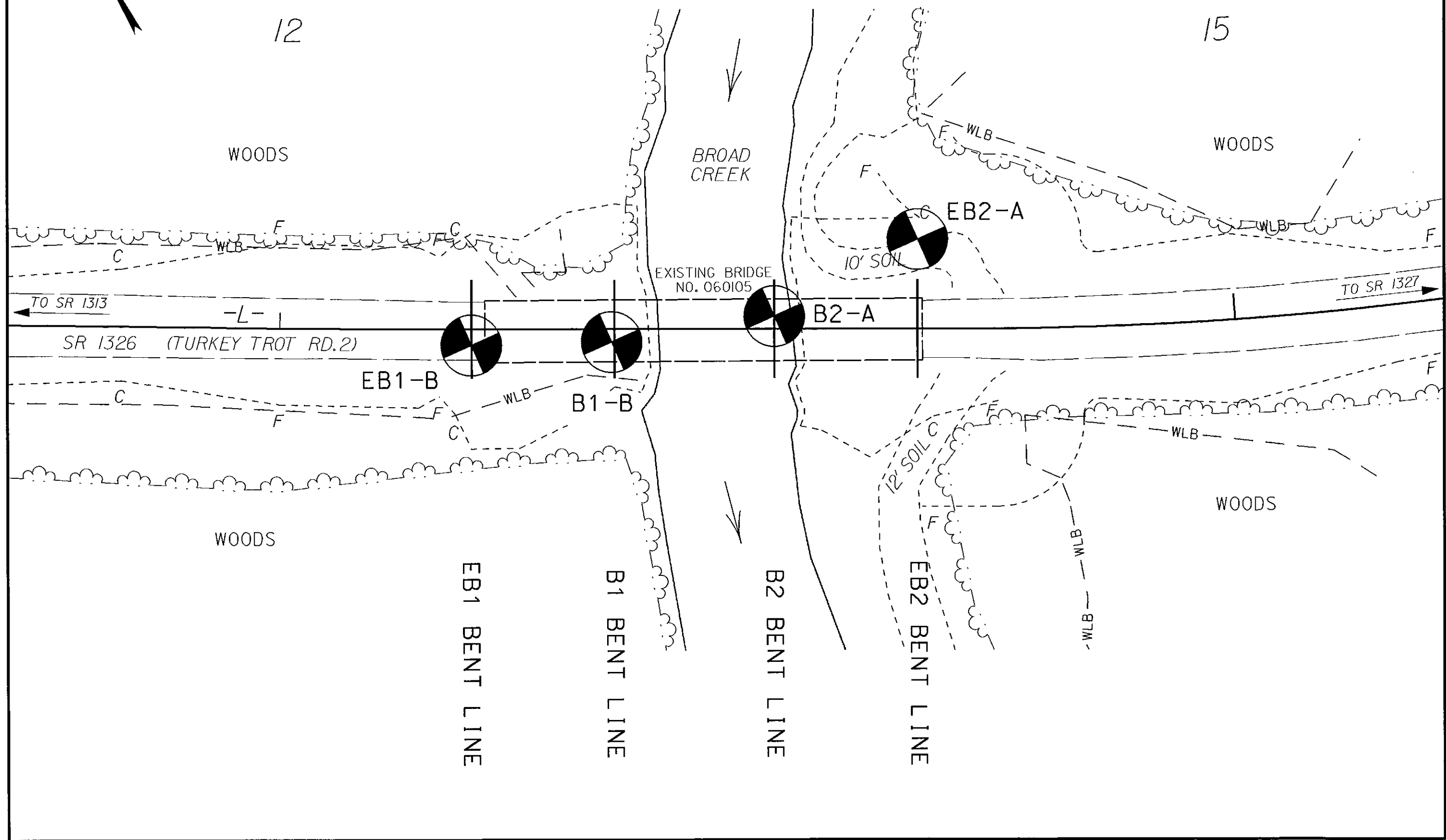
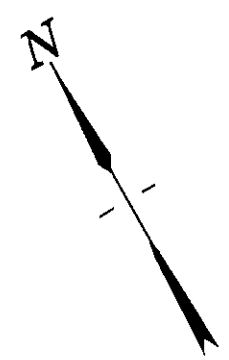
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF HIGHWAYS**  
**GEOTECHNICAL ENGINEERING UNIT**

**SUBSURFACE INVESTIGATION**

**SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASTM T296, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HEAVY PLASTIC, A-7-6										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. ALSO POORLY GRADED. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 60 BLOWS PER FOOT IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED ROCK (WR)       NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. CRYSTALLINE ROCK (CR)       FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE ROCK (NCR)       FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CP)       COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.										ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOTL.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 60 BLOWS PER FOOT. STRATA CORE RECOVERY (SCRC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: BM-1: RAILROAD SPIKE IN POWER POLE NO. 20995 AT -L- STA. 42+22, 38' RT      ELEVATION: 4.62 FT.									
SOIL LEGEND AND AASHTO CLASSIFICATION										MINERALOGICAL COMPOSITION										WEATHERING										MISCELLANEOUS SYMBOLS									
GENERAL CLASS.      GRANULAR MATERIALS (≤ 35% PASSING #200)      SILT-CLAY MATERIALS (> 35% PASSING #200)      ORGANIC MATERIALS GROUP CLASS.      A-1, A-1-b, A-3, A-2-4, A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, A-7-a, A-7-b, A-3, A-4, A-5, A-6, A-7 SYMBOL										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY      SLIGHTLY COMPRESSIBLE      LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE      LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE      LIQUID LIMIT GREATER THAN 50										FRESH      ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SLI)      ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SLI)      ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1/2 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD)      SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV)      ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL. SEVERE (SEV)      ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPARS ARE KAOLINIZED TO SOME EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, YIELDS SPT N VALUES > 100 BPF. VERY SEVERE (V SEV)      ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF. COMPLETE      ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION      SOIL SYMBOL      ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT      INFERRED SOIL BOUNDARY      INFERRED ROCK LINE      ALLUVIAL SOIL BOUNDARY      DIP & DIP DIRECTION OF ROCK STRUCTURES AUGER BORING      CORE BORING      MONITORING WELL      PIEZOMETER INSTALLATION      SLOPE INDICATOR INSTALLATION      CONE PENETROMETER TEST      SOUNDING ROD TEST BORING WITH CORE      TEST BORING W/ CORE      SPT N-VALUE      SPT REFUSAL									
PERCENTAGE OF MATERIAL      ORGANIC MATERIAL      SILT - CLAY SOILS      OTHER MATERIAL      TRACE OF ORGANIC MATTER 2 - 3%      3 - 5%      TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5%      5 - 12%      LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10%      12 - 20%      SOME 20 - 35% HIGHLY ORGANIC >10%      >20%      HIGHLY 35% AND ABOVE										GROUND WATER      WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING      STATIC WATER LEVEL AFTER 24 HOURS      PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA      SPRING OR SEEP										PRIMARY SOIL TYPE      COMPACTNESS OR CONSISTENCY      RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)      RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> ) GENERALLY GRANULAR MATERIAL (NON-COHESIVE)      VERY LOOSE, LOOSE, MEDIUM DENSE, DENSE, VERY DENSE      <4, 4 TO 10, 10 TO 30, 30 TO 50, >50      N/A GENERALLY SILT-CLAY MATERIAL (COHESIVE)      VERY SOFT, SOFT, MEDIUM STIFF, STIFF, VERY STIFF, HARD      <2, 2 TO 4, 4 TO 8, 8 TO 15, 15 TO 30, >30      <0.25, 0.25 TO 0.50, 0.5 TO 1.0, 1 TO 2, 2 TO 4, >4										U.S. STD. SIEVE SIZE      4, 10, 40, 60, 200, 270      OPENING (MM)      4.75, 2.00, 0.42, 0.25, 0.075, 0.053 BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE. SD.), FINE SAND (F. SD.), SILT (SL.), CLAY (CL.) GRAIN SIZE      MM      305, 75, 2.0, 0.25, 0.05, 0.005      IN.      12, 3									
SOIL MOISTURE - CORRELATION OF TERMS										ABBREVIATIONS										ROCK HARDNESS										EQUIPMENT USED ON SUBJECT PROJECT									
SOIL MOISTURE SCALE (ATTERBERG LIMITS)      FIELD MOISTURE DESCRIPTION      GUIDE FOR FIELD MOISTURE DESCRIPTION LL - LIQUID LIMIT      - SATURATED - (SAT.)      USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PL - PLASTIC LIMIT      - WET - (W)      SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OY - OPTIMUM MOISTURE SHRINKAGE LIMIT      - MOIST - (M)      SOLID; AT OR NEAR OPTIMUM MOISTURE SL -      - DRY - (D)      REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE										AR - AUGER REFUSAL      MED. - MEDIUM      VST - VANE SHEAR TEST BT - BORING TERMINATED      MICA - MICACEOUS      WEA. - WEATHERED CL - CLAY      MOD. - MODERATELY      W - UNIT WEIGHT CPT - CONE PENETRATION TEST      NP - NON PLASTIC      % - DRY UNIT WEIGHT CSE. - COARSE      ORG. - ORGANIC      S - BULK DMT - DILATOMETER TEST      PNT - PRESSUREMETER TEST      SS - SPLIT SPOON DPT - DYNAMIC PENETRATION TEST      SAP. - SAPROLITIC      ST - SHELBY TUBE e - VOID RATIO      SD. - SAND, SANDY      RS - ROCK F - FINE      SL. - SILT, SILTY      RT - RECOMPACTED TRIAXIAL FOSS. - FOSSILIFEROUS      SLL. - SLIGHTLY      CBR - CALIFORNIA BEARING RATIO FRAC. - FRACTURED, FRACTURES      TCR - TRICONE REFUSAL      W - MOISTURE CONTENT FRAG. - FRAGMENTS      W - MOISTURE CONTENT      V - VERY HI. - HIGHLY										VERY HARD      CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD      CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD      CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD      CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HAND BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT      CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT      CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.										DRILL UNITS:      MOBILE B-      BK-51      CME-45C      CME-55B      PORTABLE HOIST ADVANCING TOOLS:      CLAY BITS      6" CONTINUOUS FLIGHT AUGER      8" HOLLOW AUGERS      HARD FACED FINGER BITS      TUNG.-CARBIDE INSERTS      CASING      W/ ADVANCER      TRICONE 2 1/8" STEEL TEETH      TRICONE      TUNG.-CARB.      CORE BIT									
PLASTICITY      PLASTICITY INDEX (PI)      DRY STRENGTH      NONPLASTIC 0-5      VERY LOW LOW PLASTICITY 6-15      SLIGHT MED. PLASTICITY 16-25      MEDIUM HIGH PLASTICITY 26 OR MORE      HIGH										FRIABLE      RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED      GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED      GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED      SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.										TERM      SPACING      THICKNESS VERY WIDE      MORE THAN 10 FEET      > 4 FEET WIDE      3 TO 10 FEET      1.5 - 4 FEET MODERATELY CLOSE      1 TO 3 FEET      THINLY BEDDED CLOSE      0.16 TO 1 FEET      0.16 - 1.5 FEET VERY CLOSE      LESS THAN 0.16 FEET      VERY THINLY BEDDED THICKLY LAMINATED      0.008 - 0.03 FEET THINLY LAMINATED      < 0.008 FEET										HAMMER TYPE:      AUTOMATIC      MANUAL CORE SIZE:      B      N      H HAND TOOLS:      POST HOLE DIGGER      HAND AUGER      SOUNDING ROD      VANE SHEAR TEST									
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										COLOR										NOTES:																			

SKEW = 90°



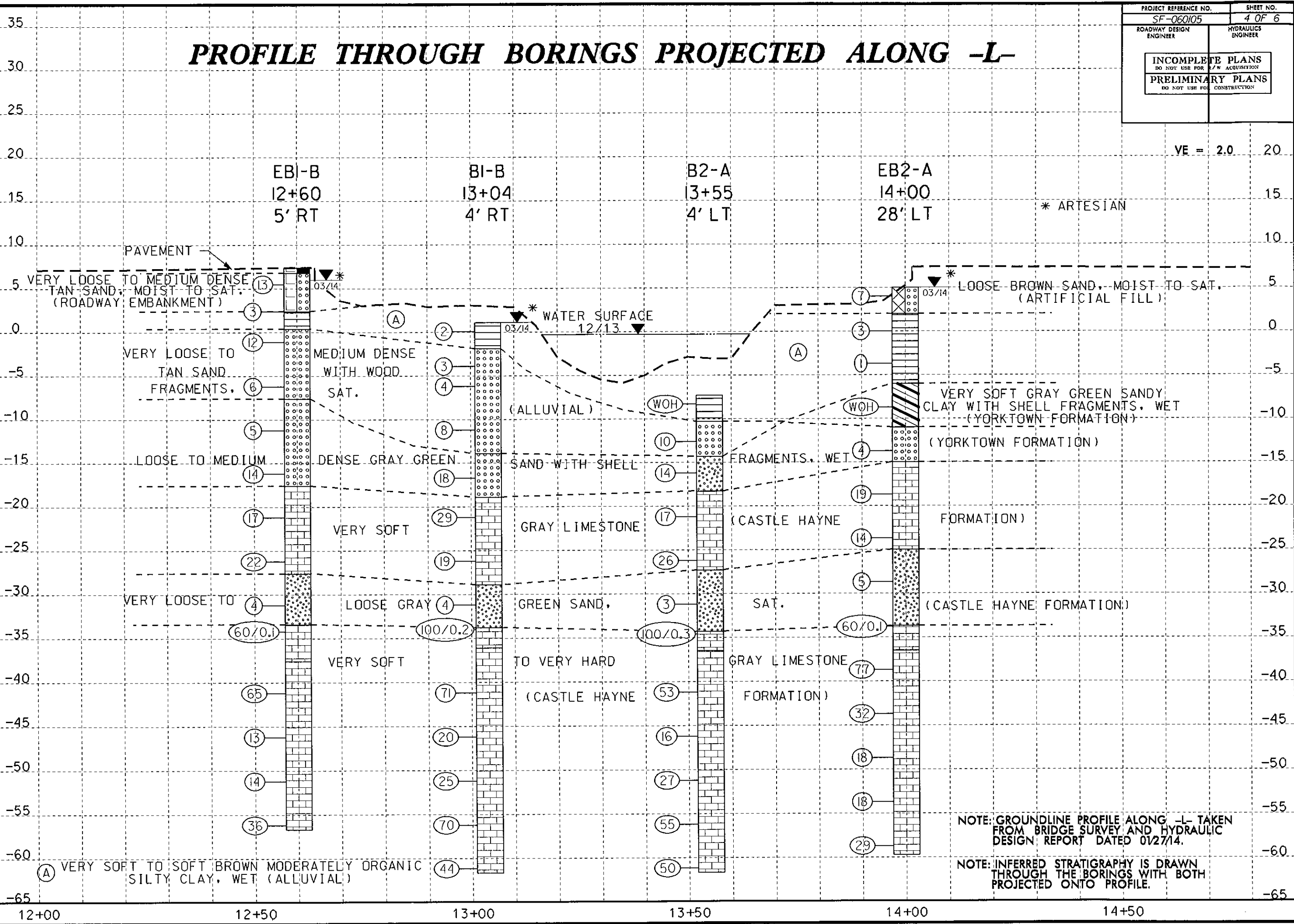
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PROJECT REFERENCE NO. SF-060105	SHEET NO. 4 OF 6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION <b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

# PROFILE THROUGH BORINGS PROJECTED ALONG -L-

VE = 2.0 20



NOTE: GROUNDLINE PROFILE ALONG -L- TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 01/27/14.

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.



